

EXPLANATION OF PLATE XXXVII.

- Fig. 1. *Limnocnida tanganica*. From a specimen in which the tentacles of the seventh order have appeared.
2. Transverse section of tentacle.—*end.* Endodermal lining of tentacle. *gl.* Mesogloea of exumbrella.
 3. Transverse section of radial canal (*R.C.*). *end.* Endoderm of radial canal. *end. l.* Endoderm lamella. *c.* Problematical corpuscles in radial canal.
 4. Surface view of the periphery of the umbrella of a specimen of *L. tanganica* var. *victoriae* from which the tentacles have become detached.—*r.* The grooved ridges in which the tentacles of orders 1 to 6 were partly imbedded.
 5. Ditto, in transverse section.
 6. Portion of bud-bearing manubrium of *L. tanganica*. One part has become detached as described by Mr. J. Moore.
 7. Ditto, with older medusa-buds having tentacles of the first and second orders developed.

7. Notes upon some African Species of the Genus *Felis*, based upon specimens recently exhibited in the Society's Gardens. By R. I. POCKOCK, F.L.S., Superintendent of the Gardens.

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(Plate XXXVIII.* and Text-figures 175–178.)

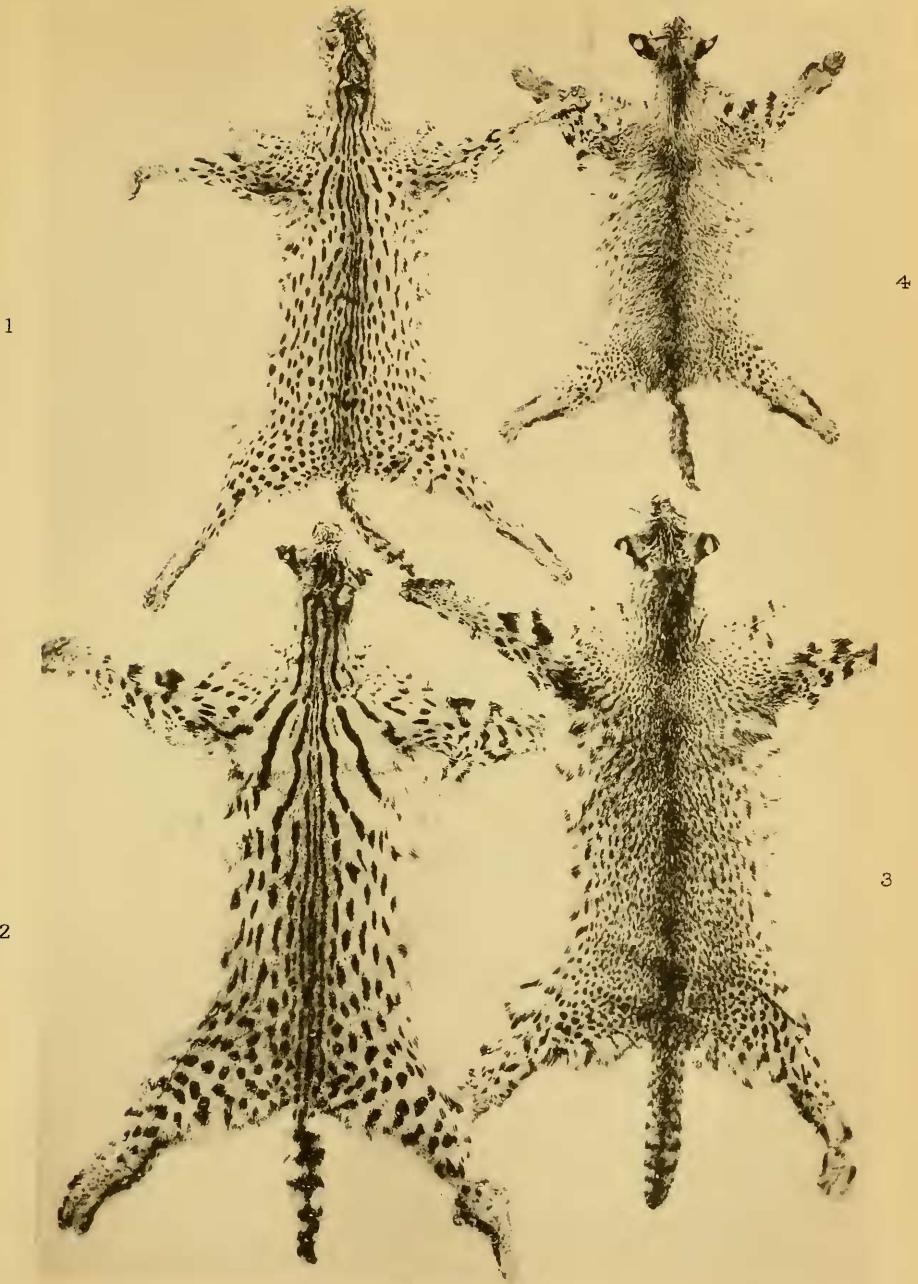
On FELIS AURATA Temminck.

The synonymy of this species is as follows:—

- Felis aurata* Temminck, Mon. Mamm. i. p. 120 (1827).
 „ *celidogaster* id. *op. cit.* p. 140.
 „ *chrysothrix* id. *op. cit.* p. 251.
 „ *chalybeata* H. Smith, Griff. An. King. ii. p. 474 (1827),
nec Herm.
 „ *neglecta* Gray, Ann. Nat. Hist. i. p. 27 (1838).
 „ *rutila* Waterh., P. Z. S. 1842, p. 130.
 „ *chrysothrix cottoni* Lydd., P. Z. S. 1906, p. 992.

Although *chrysothrix* has been more commonly employed for this species than either *aurata* or *celidogaster*, *aurata* appears by right of page priority to be its oldest available title. The name *chrysothrix* was proposed by Temminck to replace *aurata*, apparently because he had learnt from Desmarest's work that Rafinesque had applied the name *aureus* to a North American species of *Lynx*. *Aureus*, however, does not exclude *aurata* from use in the same genus; and even if Rafinesque had written *auratus*, a good case could be made out for the retention of *aurata* Temm., on the grounds of generic distinction between the species so named and the *Lynx* described by Rafinesque. But if *aurata* be set on one side, as has been commonly done, *celidogaster* should be preferred to *chrysothrix* by those who, like Dr. Elliot, Pousargues, and Mr. Lydekker, believe the two names to belong to the same species.

* For explanation of the Plate, see p. 677.



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SKINS OF SERVALS AND SERVALINE CATS.

By a curious chain of circumstances *F. celidogaster* and *F. chalybeata* had the same type specimen, and are therefore in the strictest possible sense synonyms. Smith gave the name *chalybeata* to a skin in Bullock's Museum, which he believed went afterwards to Germany. Temminck, as he himself says, bought the skin from that Museum, without knowing apparently that Smith had already compiled a description of it.

Although the name employed by Smith was published in the same year as the three names employed by Temminck, it has never met with acceptance, probably because of its previous use in a different sense in the genus *Felis* by Hermann.

The specimen named *F. neglecta* by Gray is not distinguishable from *F. celidogaster* as described by Temminck, as Dr. Elliot has shown; and the description of *F. rutila* Waterh. might, from its wording, have been taken from the type of *F. aurata*.

Thus of the six names published between 1827 and 1842 two only have to be considered as connoting distinguishable forms, namely *aurata* (*chrysothrix*) and *celidogaster*. The former was given to a "red" and the latter to a "grey" West African Tiger-Cat.

Up to the present time there has been considerable divergence of opinion as to the value to be assigned to these two "forms." Dr. Elliot* and Pousargues† regarded them merely as colour-phases without geographical significance. Dr. Matschie‡, on the other hand, gave them full specific value. The latest writer on the subject, Mr. Lydekker§, adopted a third course. While agreeing with Dr. Elliot and Pousargues that only one species is concerned, he believed, with Dr. Matschie, that the above-mentioned "forms" occur in definite localities. He gave them, however, subspecific rank, resuscitated "*rutila*" as a third subspecies and added a fourth, *cottoni*, which was described as new.

His conclusions may be briefly summarised as follows:—

1. *F. chrysothrix rutila*. Red form. Gambia and Cameroons.
2. *F. c. typica* ||. Brown form. Lower Guinea.
3. *F. c. celidogaster*. Grey form. Upper Guinea; (?) Gambia.
4. *F. c. cottoni*. Dusky form. Ituri forest.

It can, however, I think be shown that the conclusion respecting the local distribution of the colour-types is untenable.

This opinion is supported by the following facts. Although the locality of the type of *F. aurata* (= *chrysothrix*) was unrecorded, the type of *F. rutila* came from the Mandingo country inland of Sierra Leone. The locality of the type of *F. celidogaster* was also unknown, but Temminck subsequently obtained a skin he identified as *F. celidogaster* from Ashanti¶; and under the name

* Mon. Felidae, pl. xxv. (1883).

† Ann. Sci. Nat. (8) iii. p. 322 (1896).

‡ Mitth. deutsch. Schutz. vi. pt. 3, p. 10 (1893); S.B. Ges. Nat. Fr. Berlin, 1895, p. 196.

§ P. Z. S. 1906, pp. 992-995. These authors use the name *chrysothrix*.

|| Temminck, however, described this as "*roux-bai très vif*."

¶ Esquisse Zool. Guiné, pp. 86-88 (1853).

F. neglecta, Gray redescribed *F. celidogaster* from Sierra Leone. Thus, since *neglecta* and *rutila* are respectively synonyms of *celidogaster* and *aurata*, it appears that both the "grey" and the "red" forms occur in the neighbourhood of Sierra Leone.

Karsch records *F. aurata* (*chrysothrix*) from Bismarckburg in Togoland* ; Pousargues examined skins of the grey-brown type obtained from natives in the French Congo † ; and Sir Harry Johnston declares that the "red" and the "grey" types live side by side in Liberia ‡.

Thus the published localities can scarcely be said to support, though they do not wholly discredit, the belief that the "red" and the "grey" forms represent geographical races.

A study of the skins available for examination still further refutes the idea.

In the British Museum there are in all seven skins of this species. Their characters and other particulars regarding them are as follows :—

1. Cameroons (*G. L. Bates*).—Bay-red ; dorsal area not spotted, sides faintly marked with small close-set spots ; outer side of limbs faintly spotted ; tail with decided median black stripe, not barred ; ventral surface yellowish (? discoloured), marked with large dark brown spots. This belongs to the *F. aurata*-type.

2. Cameroons (*G. L. Bates*).—Differs from the last in being a dirty greyish-brown washed with yellow on the sides and rather more clearly spotted. Dirty white below. This comes nearest to the *F. celidogaster*-type.

3. Cameroons (*G. L. Bates*).—Like no. 2 in colour but with less yellow on the sides and with the median area of the back darker and more sharply contrasted with the sides in tint. This also is nearest to the *F. celidogaster*-type.

4. Benito River, Congo, 25 miles from coast (*G. L. Bates*).—Like no. 1 in markings and general tint, but not quite so bright a red.

5. Senegal § (*Winwood Reade*).—Practically like nos. 1 and 4.

6. Sierra Leone (type of *neglecta* Gray).—Grey, greyer than nos. 2 and 3 and spotted all over, the spots in the middle area of the back forming abbreviated longitudinal streaks. As already stated, this belongs to the *F. celidogaster*-type.

7. Ashanti ; obtained from dealer.—Spotted all over, the spots forming comparatively large blotches darker and more rufous than the ground-colour, which on the sides of the body is greyish, but is decidedly more rufous on the head, neck, the dorsal area, the tail, and the legs. The tail has a median dorsal line and distinct lateral bars.

* Mitth. deutsch. Schutz. vi. pt. 3, p. 10 (1893).

† Ann. Sci. Nat. (8) iii. p. 322 (1896).

‡ 'Liberia,' ii. p. 702 (1906).

§ The locality of Winwood Reade's collection is doubtful, Mr. Thomas tells me.

In the size, distinctness, and the suggestion of the rosette-shape in the spots, this specimen resembles more closely than any that I have seen the example from near Cape Coast Castle, that formerly lived in the Gardens, and was figured by Dr. Selater on pl. xxvii. in the 'Proceedings' for 1873.

In the collection of the Zoological Society there are three complete skins:—

1. W. Africa; obtained from a dealer and therefore without trustworthy locality.—General coloration rufous, greyer on the sides than on the back, neck, head, and tail. Marked all over with reddish-brown spots, forming indistinct lines on the back, neck, and head; tail with median line and indistinct bars. This must be regarded as a rufous form of *F. celidogaster*. It is somewhat like no. 7 of the above-given B. M. series; and also like the example from Cape Coast Castle figured by Dr. Selater, but is less distinctly spotted than either.

2. Accra.—Differs principally from the last in being of a grey or slightly brownish-grey colour all over, the spots being dark brown instead of rufous-brown. The crown of the head is very distinctly striped and the postocular stripe is well defined. This appears to be typical *F. celidogaster*.

3. Sierra Leone.—This specimen is by far the most interesting of the three. It agrees almost exactly with the skin Mr. Lydekker made the type of *F. c. cottoni*, remarking that its dark hue is evidently an adaptation to its habitat in the Ituri forest. Our specimen, however, came from Sierra Leone, considerably over 2000 miles from the Ituri forest. Nor is this all. When first imported and presented to the Society by Mr. Hudson on June 21st, 1906, the live specimen was unspotted, except beneath, and of a rufous-brown colour exactly recalling the tint of a rich dark-hued Puma (*F. concolor*). *But in four months' time the colour entirely changed from rufous to grey.* This was effected by the fading of the pale band in the distal half of each individual hair from red to nearly white, the white with the terminal black portion combining to produce the grey tint. Unfortunately, the animal died in November, so that no further observations could be made; but happily he lived long enough to prove that the rufous and the greyish phases may succeed one another in a comparatively short space of time in the life-history of a single individual of this species*. That such a change might occur was suspected by Dr. Elliot, who noticed that in the type of *F. celidogaster* Temm. the end of the tail was red like that of the type of *F. chrysothrix*, "as though the animal had been changing its coat from one colour to the other." This gave him the idea that the change might be seasonal. The truth of the suspicion as to the

* What is true of this species may also be true of others. Several species of Cats are known to be dimorphic in colour, like, for example, *F. jaguarondi*. But no actual change of the one colour into the other such as is described above, has as yet been recorded.

occurrence of the change is fully confirmed; but whether it is seasonal or not still remains unknown. It is, however, possible that the new coat is always red, and fades to grey before being replaced at the end of the year.

The above mentioned facts prove conclusively that the "colour" cannot be used as a basis for splitting *Felis aurata* into two or more local races; since the red and the grey phases may succeed one another in the life of the individual; and red and grey individuals occur side by side in the same localities. On the other hand, the material available for examination seems to justify the provisional recognition of two subspecific forms distinguishable by "pattern," that is, by the size and distribution of their spots. These may be defined as follows:—

a. *F. aurata celidogaster* (= *chalybeata* + *neglecta*).

Primitive form; red or grey in colour, but spotted or striped on the crown of the head, the neck, and the median area of the back; the spots on the sides of the body distinct, of comparatively large size and comparatively few in number. Tail distinctly or indistinctly banded.—Sierra Leone, Liberia, Ashanti, Cape Coast Castle, Accra.

b. *F. aurata aurata* (= *chrysothrix* + *rutila* + *cottoni*).

Derivative form; red or grey in colour, with the pattern evanescent on the head, neck, and dorsal area of the body, but generally retained on the sides as small, numerous, close-set spots; tail not or only indistinctly banded.—Sierra Leone, Mandingo Country, ? Liberia, "hinterland von Bismarckburg"*, Cameroons, Benito River; and the French Congo † eastwards to the Ituri forest.

It must be freely conceded, however, that the arguments in favour of the subspecific distinctness of *F. a. aurata* and *F. a. celidogaster* on the characters I have indicated are somewhat weakened by the recorded occurrence of both forms in Sierra Leone and possibly in Liberia.

Of the specimens of this Cat obtained by Sir Harry Johnston in Liberia ('Liberia,' vol. ii. 1906), those represented on the plate and by the right-hand photograph on p. 703, evidently belong to the large-spotted or *F. a. celidogaster*-form. Regarding the other I am a little in doubt. But it appears to belong rather to the *F. a. aurata*-form. The two flat skins, obviously native-prepared, are said to have come from the same locality. Sir Harry Johnston repeats Matschie's statement that the grey form is larger than the red. I can find no evidence of any value bearing upon this point. Indeed, of the two skins photographed in Sir Harry Johnston's book, the one of the red type is longer than the other measured from the root of the tail to the fore part of the shoulder.

* Karsch, Mitth. deutsch. Schutz. vi. pt. 3, p. 10 (1893).

† Pousargues describes two skins of this type obtained from natives of the Sanga and of the country of the Eschiras (Ann. Sci. Nat. [8] iii. p. 322, 1896).

There are two more interesting features to be noted in connection with this species. I have not seen it stated in any description that the hair on the upper side of the neck, from a

Text-fig. 175.



Skull of *Felis aurata*, $\frac{2}{3}$ nat. size.
(Specimen no. 2 of Zoological Society's series.
Lateral and ventral views.

point between the shoulders to a transverse line in front of the anterior rim of the ears on the crown of the head, *grows forwards*. This area is defined on each side by a crest, and is marked posteriorly by a single or double whorl on the shoulders. This is a most noticeable character in all the skins I have examined. It serves to distinguish the skins of *F. aurata* at a glance from those of all the small or medium-sized African and Oriental species of *Felis*. It is, however, paralleled in some South-American species like *F. pardalis* and *F. tigrina*, in which its systematic value does not appear to have been thoroughly worked out*.

The second character is the shape of the mesopterygoid fossa of the skull (text-fig. 175, p. 661), which is narrow and elliptically rounded in front, and thus differs from this fossa in all other African species of *Felis* and approaches that of some of the Oriental and South-American species. Indeed, I do not doubt that *F. aurata* is to be classified in a group of which *F. pardalis* is one of the South-American, and *F. temmincki* one of the Oriental representatives, and not with the groups exemplified in Africa respectively by *F. serval*, *F. caracal*, and *F. ocreata*.

As a working hypothesis, it may be held that this group to which *F. aurata* belongs originated in the Europæo-Asiatic continent and migrated thence in a south-easterly direction as far as Borneo. From the Oriental Region it passed into tropical West Africa. Into America it made its way probably by the Alaskan route and spread southwards through the continent as far as Chili and Patagonia. There is as yet no reason to think that *Felis* entered Africa at a sufficiently early date to pass direct to America by the transatlantic bridge, which is believed to have joined these two continents together formerly.

At the present time the distribution of this group is discontinuous; but there are many known instances of affinity between the faunas of the Congo basin in Africa and of the Indo-Malayan area of the Oriental Region; and also between the faunas of the latter area and of the Neotropical Region. Hence there is nothing extravagant in the claim that *Felis aurata* is nearly related to species now inhabiting those areas, despite its distributional isolation.

On FELIS SERVALINA Ogilby. (Plate XXXVIII. figs. 3, 4.)

Felis servalina Ogilby, P. Z. S. 1839, p. 4; Scater, P. Z. S. 1874, p. 495, pl. lxiii.; Thomas, P. Z. S. 1888, p. 5; Lydekker, Cats etc., Lloyd's Nat. Hist. pp. 135-136 (1896).

Felis serval Elliot, Mon. Felidæ, pl. xxvi., 1883 (in part).

Trouessart (Cat. Mamm. 1906, p. 274), misled apparently by Gray (P. Z. S. 1867, p. 272), cites *F. servalina* Ogilby as a synonym of *F. chrysothrix*. This is an error. The type of *F. servalina* is

* See O. Thomas, Ann. Mag. Nat. Hist. (7) xii. pp. 235-237, 1903. This peculiarity is very well shown in the figure of an example of *F. tigrina* which Schreber printed as an illustration of *Felis onca* Linn. (Säng. iii. pl. cii.).

in the British Museum, and proves the correctness of Dr. Selater's determination of the species as a Cat related to *F. serval* but closely speckled (P. Z. S. 1874, p. 495, pl. lxiii.). Dr. Elliot indeed, and following him Mr. Lydekker, gives *F. servalina* as a synonym of *F. serval**.

I cannot ascertain with certainty where this form, even if it be regarded merely as a subspecies, is placed in Trouessart's Catalogue of Mammalia. I can only surmise that it is dismissed as a synonym of *Felis galeopardus* of Desmarest, with which, presumably on Matschie's authority, *F. senegalensis* Lesson is identified. If this be so a double error is involved, for *F. servalina* Ogilby is not identical either with *F. galeopardus* or with *F. senegalensis*, and *F. senegalensis*, judging from the figure, is different from *F. galeopardus*.

The descriptions and figures both of *F. galeopardus* and *F. senegalensis* leave no doubt that these two resemble the typical Serval in that the pattern on the neck, and at least the fore part of the back, consists of definite and tolerably widely separated longitudinal stripes. This is not the case in *F. servalina*. *F. galeopardus* and *F. senegalensis* are further discussed (p. 667) under the heading *F. serval*.

The exact systematic status of *F. servalina* is a question about which the opinions of authors are divided and undecided. In every particular but pattern, that is to say in general form, length and slenderness of limb, length of tail, size of ears, and form of skull, it resembles *F. serval*. Even in pattern the difference is rather one of degree than of kind. It is quite easy to imagine the transition from *F. serval* to *F. servalina* by the breaking up of the cervical, scapular, and spinal stripes and of the larger spots on the body in *F. serval* into a countless multitude of small close-set spots showing obscure indication of serial arrangement usually only on the spinal and cervical areas. The differences might well be regarded merely as of subspecific importance or perhaps as indicative of variation comparable, as Sir H. Johnston has remarked †, to that of the speckled leopard-skins recorded by Dr. Günther from Grahamstown in S. Africa (see *infra*, p. 676).

The available evidence, however, seems to me to be in favour of regarding *F. servalina* as a valid species. In the first place, there are, so far as I am aware, no skins showing a complete series of gradations between this form and the typical Serval ‡. This is opposed to the conclusion that the two are geographical races of the same species. In the second place, the distribution of

* It seems singular that Mivart when preparing his monograph of the Cats did not take the trouble to look up the type of *servalina* to settle the status of this form, but, after comparing the species with '*neglecta*,' dismissed it with the words "the type is said to be in the British Museum." (The Cat, p. 408, 1881.)

† 'The Uganda Protectorate,' i. p. 367, 1902.

‡ Sir H. Johnston ('Uganda Protectorate,' i. p. 366) says: "It is not very uncommon to see skins which are intermediate in markings between the extremely small and numerous spots of the Servaline and the bold black patches and stripes of the common Serval." The meaning of the term 'intermediate' is sufficiently lacking in precision

F. servalina appears to coincide very closely with that of many West African animals like the Chimpanzee, *Felis aurata* and others. In the British Museum there are skins from Senegal (Winwood Reade*), Sierra Leone (the type), Monbuttu (Emin Pasha), and Entebbe. In 1874 Dr. Selater recorded it from Kinsembo on the borders of Angola and the Congo. Bocage saw skins from the interior of Angola and from Caconda†; and Sir Harry Johnston remarks that it is found in the Kingdom of Uganda and in the western province of the Protectorate. These localities suggest that *F. servalina* occurs on the fringe of the West African forest-region. How far it extends into the heart of that area is a matter for conjecture. The omission of the species from Pousargues's Catalogue of the Mammalian fauna of the French Congo must be cited as evidence adverse to the conclusion that it is found throughout the Congoese district. At the same time the omission may be attributed merely to the scarcity of the animal.

That *F. serval* and *F. servalina* have been recorded from the same country is indisputable; but, so far as I am aware, there is as yet no convincing evidence that the two forms are found side by side on the same spot. Skins of both, for example, have been sent to Europe labelled 'Sierra Leone,' 'Uganda,' and 'Angola.' Such labels, however, are no proof that the two are found together. On the other hand, Mr. Spencer Shield (quoted by Dr. Selater) speaks of the Serval as common in Angola and Loango. Bocage received the Serval from several places in Angola (Ambacca, Quillengues, and Huilla). Both these authors give different localities in Angola for *F. servalina*, and neither expresses a doubt as to the distinctness of the two forms. Finally Sir Harry Johnston states that the Serval is abundant in the Uganda Protectorate up to the verge of the Congo forest, though not within the forest; and he speaks in different terms of the distribution of the Servaline Cat within that country. This is clearly a question about which more evidence is required before a correct opinion can with certainty be arrived at; but as a working hypothesis it may be assumed that *F. servalina* inhabits the triangular area, or at all events the fringe of that area, whose angles are situated, broadly speaking, at Sierra Leone, Angola, and Uganda; and that the Serval is distributed in the countries lying to the north, east, and south of that area. Here and there it appears that the two 'forms' mutually encroach on each other's territories, without, however, actually meeting in the same places, each probably being addicted to a particular kind of country.

to prevent this statement and the one I have made from being necessarily contradictory. Some examples of *F. serval senegalensis* are, in a sense, intermediate in pattern between boldly blotched examples of typical or subtypical Servals and of *F. servalina*; but there is no doubt whatever as to which of the two forms they belong.

* The localities of this collector's material are, I understand, open to doubt.

† J. Sci. Lisboa (2) i. p. 176, 1890.

If in the future it be shown that the two live side by side in the same locality, the fact might be cited as evidence either of their specific distinctness or of their dimorphic nature. It will be opposed to the view that they are subspecific forms. The best evidence for the latter will be the discovery of truly intermediate types; and the best evidence for their dimorphism will perhaps be the occurrence of the two types in the same litter of kittens known to be the progeny of parents resembling each other in pattern.

The skins I have had an opportunity of examining seem to show that *F. servalina* is itself represented by geographical races. Of these I recognise four, namely, the typical race from Sierra Leone, a second from Monbuttu, a third from Uganda (Entebbe), and a fourth from Mombasa.

These may be diagnosed as follows:—

Subspecies *SERVALINA* Ogilby.

Ground-colour olive-yellow; fore part of shoulders, top and sides of neck unspotted. Behind the unspotted area the spots are at first faint but become gradually more and more distinct posteriorly along the back.

Loc. Sierra Leone. (Type, B. M. no. 55.12.29.412.)

The type is a native-prepared skin without the head. The two native-made skins, also headless, brought back by Winwood Reade and labelled Senegambia are much like the type, but one of them shows markings on the neck.

Subspecies *PANTASTICTA*, nov. (Plate XXXVIII. fig. 3.)

Differs from the typical *F. s. servalina* in having the neck (and also the head) distinctly streaked longitudinally and the shoulders as thickly and as distinctly spotted as the back and sides. Moreover, the ground-colour is of a richer yellow hue.

Loc. Uganda: Entebbe. (Type, B. M. no. 6.3.10.1. *E. A. Minchin.*)

A very beautifully marked example of this race, labelled "Uganda," was presented to the Society on June 4th, 1898, by Mr. F. G. Hall, and lived eight years in the Gardens.

This example is somewhat more richly coloured than the type from Entebbe, possibly because the latter is slightly more faded. The difference in tint between these Uganda specimens and the earlier procured examples referred to the typical subspecies may also be due to fading of the latter. On the other hand, examples of the true Serval from Uganda appear to be more richly tinted than those from Senegal; and the same may be the case with the Servaline Cats.

Subspecies *POLIOTRICHA*, nov.

F. servalina Thos. P. Z. S. 1888, p. 5.

Dorsal area olive-grey; sides of the body and thighs markedly greyish, the pale distal portion of the hairs being almost white instead of yellow as in the other subspecies; front of the fore and

hind legs also less yellow; and on the sides of the body the stripes run more definitely into wavy longitudinal streaks, their arrangement being more regular than in the others. Head and neck distinctly streaked and shoulders spotted as in *F. s. pantasticta*.

Loc. Monbuttu. (Type, B. M. no. 87.12.1.5, *Emin Pasha*.)

Subspecies LIPOSTICTA, nov. (Plate XXXVIII. fig. 4.)

Distinguishable at once from the typical and other subspecies of *F. servalina* by the evanescence of the spots on the dorsal area of the body, at least the median third of the flat skin being practically self-coloured almost like that of *F. chaus*. Low down on the sides and on the white of the belly there are a few rather indistinct dusky spots. On the thighs and shoulders the spots appear at a somewhat higher level than on the body, and gradually increase in size and blackness towards the elbow and hock. The neck is at most very faintly lined, but there are practically no spots on the forehead or cheeks. The tail is confusedly spotted above proximally and marked with narrow bars distally. The general colour is a tawny yellow with an ashy tinge.

Loc. Mombasa.

A single young female specimen was presented to the Society by the Rev. Ernest Millar on June 23rd, 1897 and died on the 14th of July of the same year. The flat skin from the ears to the roots of the tail measures 23 English inches. The skull shows that the animal was just changing its teeth. The permanent canines and carnassials of the upper jaw are half through, the molars are fully formed; the milk carnassials are still in place. In the lower jaw the carnassials (molars) are in place, and the two milk premolars still present on one side, though on the left the anterior is gone: the canines are both half up. In both upper and lower jaws the permanent incisors appear to be fully formed. The length of the lower permanent carnassial is 10 mm., of the upper 13.

It is possible that this specimen was not actually caught at Mombasa. Since Mombasa, however, was the port of shipment, it is probable that the Cat came from British East Africa, perhaps from some place on the Mombasa to Uganda Railway.

The characters of the four subspecies may be tabulated as follows:—

- | | | |
|------------------|--|----------------------|
| a. | Back from behind shoulders to root of tail without distinct spots or stripes | <i>liposticta</i> . |
| a ¹ . | Back thickly and distinctly spotted, with a narrow median spinal stripe usually traceable. | |
| b. | Fore part of shoulders, sides and upper surface of neck practically unspotted and unstriped | <i>servalina</i> . |
| b ¹ . | Fore part of shoulders as thickly spotted as the back; upper side of neck longitudinally streaked. | |
| c. | Sides of the body and thighs with ground-colour a rich tawny yellow | <i>pantasticta</i> . |
| c ¹ . | Sides of the body and thighs with ground-colour decidedly grey | <i>poliotricha</i> . |

On *FELIS SERVAL* Schreb. (Plate XXXVIII. figs. 1, 2.)

Subsp. *SENEGALENSIS* Lesson. (Plate XXXVIII. fig. 1.)

Felis senegalensis Lesson, Mag. Zool. 1839, pl. x.

Matschie cites *F. senegalensis* as a synonym of the earlier described *F. galeopardus* of Desmarest (Mammalogie, pp. 227-228, 1820). Judging from the figures of the types of the two forms, I should say this opinion is untenable. In both there are very definite tolerably widely spaced cervical and dorsal stripes, but whereas in *F. senegalensis* the sides of the body are covered with numerous small rather close-set spots, in *F. galeopardus* the spots are larger and much less closely set. This difference, coupled with the fact that the locality of the type of *F. galeopardus* is unknown, makes the acceptance of Matschie's opinion impossible without some evidence to support it. For the type of *F. galeopardus* I select the specimen represented by the figure in F. Cuvier's Hist. Nat. Mamm. i. 1818. This figure and the accompanying text were published two years before the issue of Desmarest's volume, and Desmarest not only quotes them but inserts Cuvier's name as his authority, at the end of the description of *F. galeopardus*. A reduced copy of Cuvier's figure is published in Jardine's Nat. Libr., Felina, pl. xxiv., 1837, and in Mr. Lydekker's volume on Cats in Lloyd's Nat. Hist. pl. xiv., 1896.

Of *F. serval senegalensis* there is a good photograph in Sir Harry Johnston's 'Liberia,' ii. p. 701, 1906. The numerous round and close-set spots forming 8 or 9 rows from belly to back on each side are very clearly shown. This example came from the Liberian border, presumably the northern border; and judging from the photograph the animal must have resembled very closely a specimen from Sierra Leone, now living in the Gardens, which was presented by Mr. Hudson with the example of *Felis aurata* above described (p. 659). It is important to record that this specimen lived in the Gardens about a year. It grew a great deal, but did not appreciably alter in colour or pattern.

F. s. senegalensis may be said to have about 17 or 19 rows of spots across the body dorsally from belly to belly, including the median spinal and the two dorso-lateral stripes. The rows, however, are extremely difficult to count, and it is easy to decrease or increase the total by one or two on each or either side. Nevertheless in the main it is true that this subspecies has smaller and considerably more spots than Servals occurring in certain other parts of Africa. In some of the latter the spots are much more elongate and their serial arrangement much more evident than in *F. s. senegalensis* (Plate XXXVIII. fig. 2).

The number of rows also is less on the whole, amounting to only about 15*, regarding the spinal stripe, which is sometimes doubled, as one. Now Matschie's alleged species *F. togoensis* is said to have 20-24 rows of spots, those on the back being

* Matschie says 12-16 (SB. Ges. Nat. Fr. Berlin, 1895, p. 11c).

arranged in 5 or 7 narrow longitudinal stripes. Thus, so far as the numbers of rows are concerned, *F. s. senegalensis* is intermediate between *F. togoensis* and the typical form. The definite formation of as many as five dorsal rows is very unusual. Three is the typical number. But the figure of the type of *F. s. senegalensis* shows on the left side two stripes below the spinal stripe and above the irregularly arranged spots. Inferentially therefore, this specimen resembled at least one of those described as *F. togoensis* in having a total of five dorsal stripes.

F. togoensis is also said to be darker coloured than *F. s. senegalensis* and *F. s. serval*. In Jan. 1905, a Serval kitten from Upper Nigeria was presented to the Society by Capt. B. A. Rice. The skin of this specimen is decidedly darker and richer in hue than the typical and Senegalese Servals I have seen. In other respects it seems to resemble the example of *F. s. senegalensis* figured by Sir H. Johnston, the spots being small, numerous, close-set and irregularly disposed, there being only three definite dorsal stripes, and perhaps about eight rows of spots in addition on the sides and belly. These facts show that there is a complete gradation between *F. togoensis* and other true Servals in all the characters mentioned by Matschie as distinctive of his species. *F. togoensis*, therefore, can at most be given only subspecific rank.

On FELIS OCREATA Gmelin.

Felis ocreata Gmelin, Anh. Bruce Reisen (trans. by E. W. Cuhn), ii. p. 27 (1791); H. Schwann, Ann. Mag. Nat. Hist. (7) xiii. p. 421 (1904).

Felis lybica de Winton in Anderson's Zoology of Egypt, Mammalia, p. 117 (1902).

Subsp. UGANDÆ Schwann.

Tom. cit. p. 424.

There is a single specimen of *F. ocreata* now living in the Gardens, which is no doubt referable to this local race. It was taken as a kitten at Neri, north of Fort Hall, in Uganda, and is the property of Miss Winifred Edwardes.

The general colour is a stone-grey. The stripes on the body are scarcely defined but show up in certain lights as very pale yellowish-brown bands. On the legs they are much more distinct, the two internal brachial stripes being black and conspicuous. The distal portion of the tail is also striped with black.

Subsp. CAFRA Desm.

Felis cafra Desmarest, Encycl. Méthod., Mamm. Suppl. 1822, p. 540 (and of subsequent authors).

Early in the present year the Society received from Mr. A. W. Guthrie, C.M.Z.S., of Port Elizabeth, a young example of this race, which unfortunately died a few weeks after arrival.

I am compelled to agree with Mr. Schwann that the name

obscura Desm., admitted by Dr. Elliot to be the earliest name for this Cat and adopted for it by Mr. de Winton (Anderson's 'Mammals of Egypt,' p. 175), should not supersede *cafra*. It was probably based upon a melanistic specimen of the domestic cat described as *F. torquata*, or upon a mongrel between that breed and *F. ocreata cafra*. Mr. Schwann's reasons for rejecting Mr. de Winton's view are not, however, in my opinion convincing. He lays stress upon the fact that the cat was compared to a domestic cat in size and was too numerous and conspicuously striped for *F. o. cafra*. The first reason may be met by saying that the animal was young; and the second by the statement that Cuvier's figure of the type does not bear out the belief in the numerical excess of the stripes over those of *F. o. cafra**.

It seems to me that the type of *F. obscura* might have been a young, somewhat unusually well-striped melanistic specimen of *F. cafra*, in which the stripes would naturally show up as black bars, were it not that Cuvier's figure proves that the tail was strongly banded to the base. This is a character in which domestic cats of the *torquata*- and *catus*-breeds often, though not invariably, differ markedly from examples of *F. ocreata* and *F. sylvestris*, in which the caudal stripes are usually only well developed at the distal end of the tail. Another feature of *F. obscura* upon which Cuvier laid stress, remarking that he had never seen it in the Red-eared African Cats (*F. ocreata*), is the presence of two distinct stripes on the cheek. When the stripes are retained in domestic cats, these cheek-stripes are always visible. But since they are also present in examples of *F. o. cafra*, no great importance can be attached to them in this connection.

The colour of the coat, the banding of the tail, and Cuvier's remarks about the tameness of the Cat when at liberty, are the principal reasons which make the substitution of *obscura* for *cafra* hardly defensible.

On *FELIS NIGRIPES* Burchell.

Felis nigripes Burchell, Travels, etc. ii. p. 592 (1824); Matschie, SB. Nat. Fr. Berlin, 1894, p. 258; W. L. Sclater, Fauna of S. Africa: Mammalia, p. 40, fig. 11 (1900).

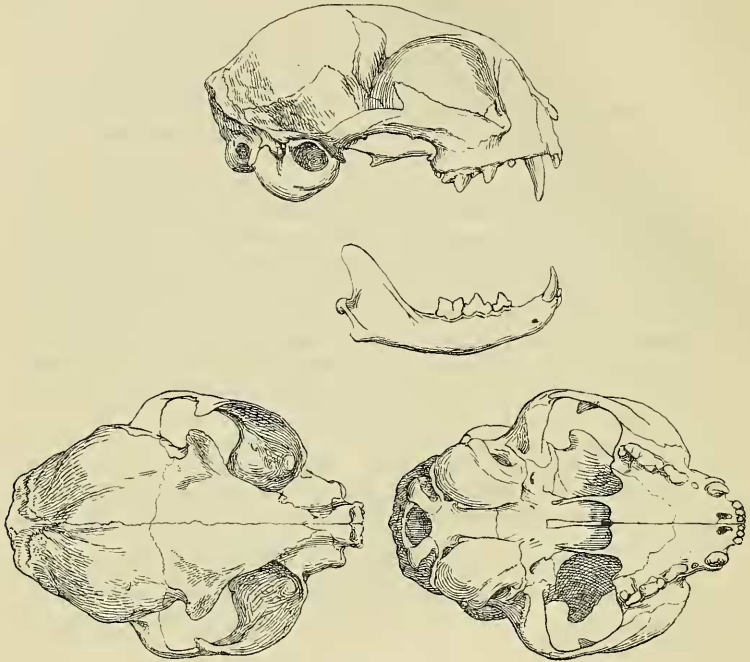
Two examples of this interesting little Cat, the smallest of all the species of *Felis*, were presented to the Society in May 1906 by Mr. A. W. Guthrie, C.M.Z.S., of Port Elizabeth. They were procured from a dealer who declared they came from the Zambesi. It would be unsafe to place any great reliance upon this statement.

Apart from colour and pattern (text-figs. 177 & 178, pp. 672 & 673) the living animal is remarkably like a diminutive domestic cat, especially about the head and face. The legs, however, are relatively shorter, and the paws exceptionally small and dainty. The iris of the eyes is yellowish green

* The early literature of *F. obscura* is as follows:—"Le chat noir du Cap," F. Cuvier, Dict. des Sci. Nat. viii. p. 222 (1817); *F. obscura* Desmarest, Encyclop. Méthod., Mamm. p. 230 (1820); F. Cuvier, Hist. Nat. Mamm. ii. pl. 128 (1826).

and the pupil contracts to a vertical slit under strong light. Except in colour, and to a less extent in pattern, this Cat bears no resemblance to the Serval as has been stated by Mr. W. L. Sclater.

Text-fig. 176.

Skull of *Felis nigripes*.

Lateral, dorsal, and ventral views.

Broadly speaking, the skull (text-fig. 176) is like that of *F. sylvestris* and *F. ocreata*. When resting on the tips of the canines and on the bullæ, its highest point is on the anterior portion of the parietals. From that point the top of the cranium descends somewhat abruptly posteriorly, while anteriorly the frontals form a more gradual descent towards the muzzle. The nasal bones and facial portion make an abrupt descent from the forehead, the plane of the nasals being nearly parallel to the line of the anterior border of the orbit. The postorbital processes are short but broad and laminate. The posterior portion of the nasals is strongly compressed. The zygomatic arches are widely expanded in their anterior or orbital moiety. The under side of the skull is remarkable for the great size of the auditory bulke; the greatest length of a bulla is equal to the distance between its anterior edge and

the palatal rim of the posterior nares; also to the width across the occipital condyles and to the distance between the posterior edge of the canine and the posterior edge of the last cheek-tooth (*m*¹) of the maxilla. The auditory meatus also is correspondingly large.

So far as dentition is concerned, the skull presents a marked difference from those of *F. ocreata* and *F. sylvestris* in the reduction of the inner cusp of the maxillary carnassial to a small rounded lobe.

The following measurements will show some other differences between the skulls of examples of *F. nigripes*, *F. ocreata*, and *F. sylvestris*.

	<i>F. nigripes</i> .	<i>F. ocreata</i> (Suakim).	<i>F. sylvestris</i> (Scotland).
Basal length	60	81	82
Breadth of cranium	39	47	47
" behind postorbital processes ...	30	26	34
" across zygomata above posterior cusp of upper carnassial.	48	61	61
" across occipital condyles	19	24	24
Length and breadth of auditory bulla...	18; 15	19; 17	18; 13
Length of palate	25	35	36
Length and height of auditory meatus .	8.5; 6	9; 6	7; 4
Length of 2nd and 3rd maxillary premolars.....	14	18	17
" of 3rd maxillary premolar (upper carnassial).....	9.5	12	12
" of 1st mandibular molar (lower carnassial).....	6.5	8.5	8

The chief differences between the skulls of *F. nigripes* and *F. ocreata* may be tabulated as follows *;—

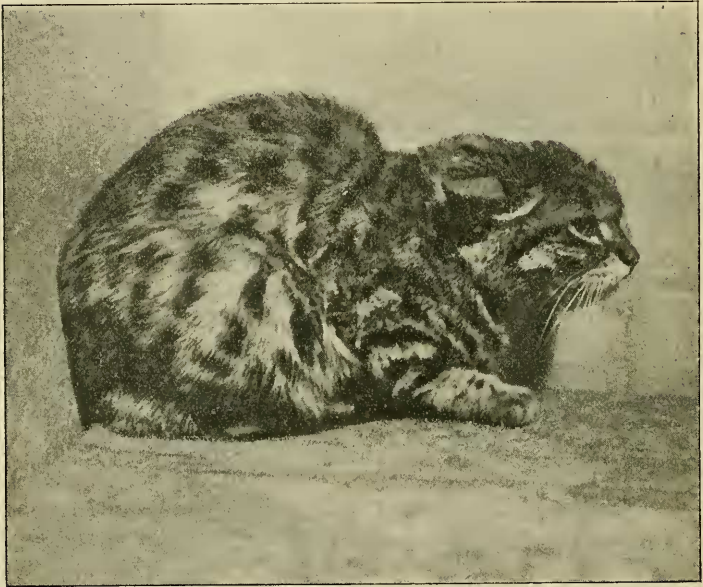
- a. Inner cusp of maxillary carnassial large; length of auditory bulla much less than the length of the space between its anterior border and that of the mesopterygoid fossa and about equal to the length of the 2nd and 3rd maxillary premolars, less than the width across the occipital condyles ... *ocreata*.
- a'. Inner cusp of maxillary carnassial reduced to a small lobe; length of auditory bulla about equal to the length of the space between its anterior border and that of the mesopterygoid fossa and to the distance between the socket of the canine and the posterior border of the 2nd premolar of the maxilla and to the width across the occipital condyles *nigripes*.

The diminutiveness of *F. nigripes* suggests that it is a dwarfed species; and its resemblance to *F. ocreata* further suggests that it

* Mr. W. L. Sclater says that the skulls of *F. nigripes* and *F. ocreata cafra* resemble each other except in the matter of size. It seems hardly likely that the skull and teeth of *F. nigripes* vary to the extent necessary for the reconciliation of this statement and that made above embodying the differences. Hence it must be supposed that Mr. Sclater never saw the skull of this species, but was merely quoting Dr. Matschie's remarks.

is a dwarfed and otherwise modified Cat of the last-mentioned type. It is not therefore a matter for surprise that in many of the characters in which the skull differs from that of *F. ocreata*, it shows an approximation to features presented by the young of that species. This is especially shown in the relatively larger brain-case and auditory bulke. The skull of a kitten of *F. ocreata* resembling that of *F. nigripes* in size differs most markedly from the skull of *F. nigripes* in that the plane of the nasals is in almost the same line as that of the anterior portion of the frontals, the fall of the face beginning only a little in front of the fronto-parietal suture.

Text-fig. 177.



Felis nigripes.

Photograph of the living animal in summer coat with markings well-defined.

It may further be noted as an interesting fact that the auditory bulke and auditory orifice in *F. nigripes* are actually nearly as large as in an adult of *F. ocreata*. The explanation of this is to be sought, I suspect, in the relative defencelessness of *F. nigripes*, which requires an acuter auditory sense than *F. ocreata*, for the purpose of evading enemies.

The following description of this species is taken from the skins in the British Museum and from the two specimens in the Society's collection.

General colour creamy or greyish fawn on the neck, sides and

dorsal surface of the body, the median dorsal area darker than the sides, the hair on the back longer and forming a sort of short

Text-fig. 178.



Felis nigripes.

Flat skin from specimen in winter coat with obscure markings.

spinal mane especially upon the lumbo-sacral area as in *F. ocreata*

45*

and *F. chaus*. Head "rabbit" grey, indistinctly or distinctly striped or spotted on the crown, rarely so on the forehead, where the stripes are evanescent. Ears short, of about the same size as in the domestic cat, coloured like the head; not apically pencilled. Stripes on the occiput black; on the nape often broken up and fading to rusty brown; those on the sides of the neck especially tending to assume a rusty hue. In front of the shoulder, short stripes extend obliquely downwards and forwards on to the neck, two of them, better marked than the rest, forming collars. A third collar crosses the interramal area, and there are at least two well-marked stripes on the cheeks. The pattern on the body consists for the most part of spots sometimes black, sometimes suffused with brown. On the dorsal area the arrangement of the spots is sometimes more or less longitudinally linear; and on the sides of the thorax two or three oblique stripes are sometimes formed. The tail has a median dark blackish-brown stripe and at its distal end about three transverse black stripes, incomplete below, and a black tip. The ventral surface from the chin to the anus, and the insides of the limbs and under side of the tail are white or whitish. The spots on the belly are large and black; also on the shoulder and thighs they are blacker as a rule than on the body. The outer side of the legs is creamy fawn; the fore leg is encircled at the base with two very broad black stripes; the sole of the foot up to the wrist is black; the paw is speckled above with black; there is an incomplete stripe above the wrist in front. The hind leg has two strong black stripes above the hock and is black behind from the pads up to the hock. The under-fur is almost sooty-black on the dorsal area, but a paler more slate-grey on the sides.

Loc. Bamanguato (*F. C. Selous*); Deelfontein (*Claud Grant*); Vredefort Road, Orange River Colony (*Barrett Hamilton*). Previously recorded from Bechuanaland and the Kalahari Desert.

The skins from different localities mentioned above differ somewhat from each other; but there is not as yet sufficient material, in my opinion, to warrant the naming of local races.

The following measurements in mm. have been taken from animals in the flesh, with exception of no. 4.

	Total length.	Head and body.	Tail.	Hind foot.	Locality.
1	528	358	170	92	Deelfontein (B.M.)
2	525	368	157	85	" "
3	506	337	169	81	(? Zambesi. Zool. Soc.)
*4	650	500	150	80	(? loc. S. Afr. Mus.)

* These measurements are recorded by Mr. Selater, presumably in inches, and are here reduced to millimetres. They were taken from a mounted specimen. Stretching of the skin probably accounts for the marked disproportion in length between the tail and the head and body.

On FELIS CARACAL Güld.

At the present time there are four Caracals living in the Gardens, an adult pair from South Africa presented by Col. Sloggett, D.S.O., R.A.M.C., a young female from Jebba in Nigeria presented by Mr. E. Lort Phillips, and a young male presented by Sir George Denton from Senegal. The South African animals have shorter tails and are rather darker and greyer in tint than those from North-western Africa; but the latter difference may be merely a question of age. A young specimen brought by Capt. Rice from Lake Chad was also more richly tinted than those presented by Col. Sloggett. But the Society's material does not justify the classification of African examples of this species into more than one subspecies.

The example brought by Capt. Rice was extraordinarily tame, although about half-grown, and played about the office with a piece of string exactly like a kitten and allowed itself to be handled without attempting to scratch or bite. The specimen sent by Sir George Denton, on the contrary, was, Dr. Hopkinson, D.S.O., tells me, absolutely savage from its earliest days, although it was taken when about a month old and always kept on a chain. The interest of these facts lies in the conclusion they enforce that fierceness in animals of this kind is a matter of individual temperament, and not a specific characteristic.

Dr. Hopkinson also tells me that Caracals appear not to be known actually in the Gambia. The species is at least unknown to the natives, and there is no name for it in any of the native languages.

On FELIS PARDUS Linn.

Subsp. LEOPARDUS Schreb.

Felis leopardus Schreber, Säug. iii. p. 387, pl. ci. (named on plate), 1777; Erxleben, Syst. Regni Anim. p. 509, 1777.

Both by Schreber and Erxleben the name *leopardus* was applied to West-African Leopards. Schreber gave the distribution as from Gambia to the Cape; but Erxleben restricted the locality to Guinea and the adjoining countries of Africa. Moreover his words "*corpore fusco maculis subcoadunatis nigris*" and "*maculis maxime approximatis*" forcibly suggest that he was acquainted with skins or living examples of the form he was describing. The so-called East-African Leopard cannot therefore be regarded as typical of "*leopardus*" as Mr. Lydekker maintained*.

* 'Great and Small Game of India,' p. 297, 1900. The synonymy of some of the larger species of Felide is still somewhat confused. For instance, Dr. Neumann speaks of the Leopard of the Atlas as '*panthera*' (Zool. Jahrb., Syst. xiii. p. 552, 1900). Dr. Trouessart, on the contrary, applies the name '*panthera*' Erl. to a Leopard inhabiting Persia, India and Ceylon (Cat. Mamm. Suppl. p. 268, 1904); and Mr. Lydekker used it for the Persian race which was subsequently named *tulliana*. It appears to me, on the contrary, to be evident that Erxleben gave the name *panthera* to the species that Schreber described as *uncia* (see Fischer, Syn. Mamm., Add. etc. p. 567=(367) 1830). At all events there are just as good, or as bad, reasons for holding that *panthera* was applied to the species we call the Snow Leopard or Ounce, and which Ehrenberg not unjustifiably named *F. irbis*, as for holding that *uncia* was applied to that species. The name *panthera* of Schreber must on Schreber's own citation be regarded as a synonym of *pardus* Linn.